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EXAMINER	
MONBLEAU, DAVIENNE N	
ART UNIT	**PAPER NUMBER**
2878	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

TH

Office Action Summary	Application No.	Applicant(s)	
	10/804,203	KNAPP, RONALD H.	
	Examiner	Art Unit	
	Davienne Monbleau	2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 November 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *4/27/07* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 11/29/07, regarding claims 1-18, have been fully considered but are moot in view of the new grounds of rejections.

Claim Objections

Claim 2, line 3: "are wound" should be changed to -- is wound -- .

Claim 15, line 5: there is insufficient antecedent basis for "the crossings".

Claim 16, line 2: "fibers" should be changed to -- fiber -- .

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones (U.S. 4,880,970) in view of Innocenti et al. (EP 0 892 244).

Regarding claim 1, *Jones (Figure 5)* teaches a sensor apparatus for tank volumen change comprising a cylinder (9), and an optical fiber (1) wound on the cylinder, the optical fiber (1) having opposite ends exposed for receiving and outputting light energy. *Jones* does not teach that the cylinder is a tank with a covering over the optical fiber. *Innocenti (Figure 1)* teaches a sensor apparatus comprising a tank (2), an optical fiber (4) wound on the tank (2), and a covering (3) over the optical fiber (4). It would have been obvious to one of ordinary skill in the art at the

time of the invention to implement the fiber sensor apparatus of *Jones* into the tank of *Innocenti* with a covering to utilize fiber micro-bending to measure a changed parameter of the tank while protecting the fiber from external effects.

Regarding claim 8, *Jones (Figure 5)* teaches a method of providing sensors for tank volume changes, comprising: providing a cylinder (9), providing an optical fiber (1) on the cylinder (9), providing obstructions on the tank (part of the optical fiber), providing pinch points (8) in the optical fiber (1) by crossing the optical fiber over the obstructions, and providing and exposing ends on the optical fiber (1) for receiving light (3) and outputting light (2). *Jones* does not teach securing the entire optical fiber or at least the pinch points to the cylinder. It is known in the art to secure a fiber to an object for measurement purposes. It would have been obvious to one of ordinary skill in the art at the time of the invention to secure at least part of the fiber to the cylinder in *Jones* to ensure that the fiber stays fixed in a desired location.

Jones does not teach that the cylinder is a tank and covering the optical fiber and the tank. *Innocenti (Figure 1)* teaches a method of providing sensors for tank volume changes comprising providing a tank (2), providing an optical fiber (4) on the tank (2), and covering (3) the optical fiber (4) and the tank (2). It would have been obvious to one of ordinary skill in the art at the time of the invention to implement the fiber sensor apparatus of *Jones* into the tank of *Innocenti* with a covering to utilize fiber micro-bending to measure a changed parameter of the tank while protecting the fiber from external effects.

Regarding claim 15, *Jones (Figure 5)* teaches a pressure cylinder apparatus, comprising a cylinder (9) having an inlet and outlet, an optical fiber (1) having opposite ends for receiving and outputting light, the opposite ends being fixed near the inlet and outlet for connecting

respectively to a light source (2) and to a light sensor (3) as the cylinder (9) experiences a pressure change, and the optical fiber (1) crossing on the outer surface of the cylinder and forming bends and pinch points (8) at the crossings. *Jones* does not teach securing the optical fiber to the cylinder. It is known in the art to secure a fiber to an object for measurement purposes. It would have been obvious to one of ordinary skill in the art at the time of the invention to secure at least part of the fiber to the cylinder in *Jones* to ensure that the fiber stays fixed in a desired location.

Jones does not teach that the cylinder is a tank filled with gas under pressure with a composite material overwrap covering the optical fiber and for withstanding internal pressure within the tank and resisting expansion of the tank. *Innocenti (Figure 1)* teaches a pressure tank apparatus comprising a tank (1) filed with gas under pressure, a fiber (4) wound over the tank (1), and a composite material overwrap (3) covering the optical fiber (4) for withstanding internal pressure within the tank (1) and resisting expansion of the tank (1). It would have been obvious to one of ordinary skill in the art at the time of the invention to implement the fiber sensor apparatus of *Jones* into the tank of *Innocenti* with a covering to utilize fiber micro-bending to measure a changed parameter of the tank while protecting the fiber from external effects.

Regarding claim 2, *Jones as modified by Innocenti (Jones, Figure 5)* teaches that the tank (9) is a cylindrical tank, and wherein the optical fiber (1) is wound in spaced loops in a first helical direction along the cylindrical tank (9) and subsequently wound in spaced loops in a second helical direction along the cylindrical tank (9).

Regarding claim 3, *Jones as modified by Innocenti (Innocenti, Figure 1)* teaches that the tank (1) is a tank liner (2), and the covering (3) comprises a filament winding in a filament wound composite gas storage tank. (See column 2, lines 24-30.)

Regarding claim 4, *Jones as modified by Innocenti (Jones, Figure 5)* teaches that the optical fiber (1) crosses over obstructions (other parts of the fiber) and forms bends over the obstructions as the optical fiber (1) is wound on the tank (9).

Regarding claim 5, *Jones as modified by Innocenti (Jones; Figure 5)* teaches that the optical fiber (1) is wound helically in first spaced coils over the tank in a first direction and is wound helically in second spaced coils over the tank and over the first spaced coils in a second direction, and wherein the first spaced coils form the obstructions and the second spaced coils form the bends where the second spaced coils cross over the first spaced coils as pinch points.

Regarding claim 6, *Jones as modified by Innocenti (Jones, Figure 5)* teaches first and second coils, but does not teach that they are secured to the tank. It is known in the art to secure a fiber to an object for measurement purposes. It would have been obvious to one of ordinary skill in the art at the time of the invention to secure at least part of the fiber to the cylinder in *Jones as modified by Innocenti* to ensure that the fiber stays fixed in a desired location.

Regarding claims 7, 13, and 18, *Jones as modified by Innocenti (Jones; Figure 5)* teaches pinch points (8), but does not teach that the pinch points are secured to the tank with a flexible adhesive. It is known in the art to use a flexible adhesive to connect and item to ensure connectivity but allow for flexibility. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a flexible adhesive in *Jones as modified by Innocenti* to

allow for the micro-bending in the fiber while maintaining a secure connection, thus detecting change of pressure and hence volume.

Regarding claim 9, *Jones as modified by Innocenti (Jones, Figure 5)* teaches that providing the tank comprises providing a cylindrical tank liner (2) (*Innocenti, Figure 1*), wherein the providing an optical fiber and obstructions on the tank comprises winding the optical fiber (1) in first spaced helical convolutions in a first direction along the cylindrical tank liner and winding the optical fiber in second spaced helical convolutions in a second direction along the cylindrical tank liner and forming the pinch points (8) in the second spaced helical convolutions where they cross over the first helical convolutions of the optical fiber.

Regarding claim 10, *Jones as modified by Innocenti (Innocenti, Figure 1)* teaches covering the optical fiber (4) with an isolator layer (3).

Regarding claim 11, *Jones as modified by Innocenti (Innocenti, Figure 1)* teaches an insolator/cover layer (3) comprising filament windings (column 2, lines 28-29) over the optical fiber (4) and over the tank liner (2) to support internal pressures within the tank liner, but does not teach that the filament windings are separate from the insolator layer. It is known in the art to use particular layering structures in pressurized gas tanks. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a particular layering structure in *Jones as modified by Innocenti* to achieve optimum support of internal pressures.

Regarding claims 12 and 17, *Jones as modified by Innocenti (Jones, Figure 5)* teaches securing an optical fiber (4) to a tank (1), but does not teach the means of securing. It is known in the art to use particular adhesives to secure components to each other. It would have been

obvious to one of ordinary skill in the art at the time of the invention to use a particular adhesive in *Innocenti as modified by Jones* to ensure accurate placement and stability of the optical fiber.

Regarding claim 14, *Jones as modified by Innocenti (Jones, Figure 5)* teaches connecting a light source (2) to one end of the optical fiber (1) and connecting a light sensor (3) to the other end of the optical fiber (1), increasing pressure within the tank liner (2), increasing bending in the pinch points (8) by resisting the increasing pressure with the filament windings, and observing transmitted light attenuation in the light sensor (6) related to expansion of the tank liner (2) and increasing bending of the pinch points (8).

Regarding claim 16, *Jones as modified by Innocenti (Jones, Figure 5)* teaches an optical fiber but does not teach an optical coupling connected to the end of the fiber and secured to the inlet and outlet of the tank. It is known in the art to use couplings to connect an end of a fiber to another optical component, as well as to secure the coupling to a desired location. It would have been obvious to one of ordinary skill in the art at the time of the invention to use secured optical couplings in *Jones as modified by Innocenti* to minimize loss and stabilize the connection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Davienne Monbleau whose telephone number is 571-272-1945. The examiner can normally be reached on Monday through Friday 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Epps can be reached on 571-272-2328. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Davienne Monbleau

Davienne Monbleau
Primary Examiner
Art Unit 2878

DNM